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HAMILTON, BROOK, SMITH & REYNOLDS, P.C.
530 VIRGINIA ROAD
P.O. BOX 9133
CONCORD, MA 01742-9133

| EXAMINER | |
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# BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/762,984
Filing Date: January 21, 2004
Appellant(s): KONING ET AL.

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David J. Thibodeau, Jr. #31671

For Appellant

## EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/17/2009 appealing from the Office action mailed 9/10/2008.

**(1) Real Party in interest**

A statement identifying by name the real party interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

US Pub 2004/0080558 Blumenau et al 04-2004

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6-10,12,14-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blumenau et al (US 2004/0080558).

As in claim 1, Blumenau discloses an apparatus for resource migration Fig 4, comprising a storage system having a plurality of storage servers (Fig 4: #401A, #401B servers) with a set of resources partitioned thereon (Fig 4: set of data in volumes),

Blumenau discloses said storage servers having a load monitor process capable of communicating with other load monitor processes for generating a measure of loading on respective ones of the plurality of servers (Blumenau's paragraphs 31-32 discloses the servers' processes communicate with each other using information in the

state table #105 to execute properly any storage processes such as backup, copy, recover etc.

Blumenau in another embodiment teaches that the state information is configured with information to allow a load balance operation, thus the state information must include a measure of loading for servers and storage elements involved, see Blumenau's paragraph 64) ; It would have been obvious to one of ordinary skill in the art at the time of invention to include the load balance's information in the configuration table as suggested by Blumenau in Blumenau's system and allowing servers to transferring data to available storage location in storage system and thereby further utilize the resources in an efficiently manner.

Blumenau further discloses a resource migration process for transferring a resource from one of said plurality of servers to another of said plurality of servers in response to said measure of loading (see Blumenau's paragraph 64, migrate data from the storage system #402A to another storage system because performance reason, processor bound approaching its performance limit etc..) ; and Blumenau further disclose a write-detect process which:

(i) detects when a resource write request applies to a resource that is in the process of being moved from a first server to a second server, and which in response to such resource write request writes copies of the resource to both of said first and second server (Blumenau's paragraph 39, detecting the write requests to be applied to an area being migrated, in response to such write requests, write to both source and target volumes to insure consistency between the source and target volumes, see Blumenau's

paragraph 40) and

(ii) in response to a write failure on the second server, restarts the migration process for the resource to ensure that the write request is propagated to the second server (Blumenau's paragraphs 39-40 discloses writing to both source and target volumes to ensure the write requests are received by both source and target volume. Blumenau's paragraphs 42 in an embodiment further discloses in response to a write failure, for example at the target, the write is not completed, the migration process is restarted "the DBMS will reissue the request").

As in claim 2, Blumenau further discloses wherein said servers are equivalent to each other (Blumenau's Fig 4, server #401A is equivalent to server #401B).

As in claim 3, Blumenau further discloses wherein said resources are selected from the group consisting of data blocks, program files, multimedia files, applications, and database files (Blumenau's paragraph 35 resources comprises files in file system, data of data bases etc..).

As in claim 4, Blumenau further discloses wherein said measure of loading reflects both a storage system load and a server load (Blumenau's paragraph 64, measure of loading of a storage system comprises storage system approaching capacity, servers approaching its performance limits etc...).

As in claim 6, Blumenau further discloses wherein the load monitor includes a process to determine whether a server is servicing a disproportionate share of the client requests being handled by a server group (Blumenau's paragraph 64).

As in claim 7, Blumenau further discloses wherein the resource migration process includes a block data migration process (Blumenau's paragraphs 50-51, migration of block of data, a unit of storage, a location on the disk).

As in claim 8, Blumenau further discloses a routing table for tracking resources maintained on the system (Blumenau's Fig 3: #301 state information table to track resources routing among source and target volumes).

As in claim 9, Blumenau further discloses wherein a pointer to a resource is maintained during an access operation to provide continuous data access (Blumenau's paragraph 50, state information #310 includes indicator points to location of resource to provide for continuous data access).

As in claim 10, Blumenau further discloses wherein the load monitoring process monitors one or more of network traffic load, I/O request load, storage traffic pattern type (Paragraph 64, monitoring I/O request load to servers).

As in claim 12, Blumenau further discloses wherein the resource migration process divides the resource being moved into smaller subresources , and wherein the write-detect process:

(i) detects when a resource write request applies to a subresource that is in the process of being moved from a first server to a second server, and in response to such resource write request writes copies of the subresource to both of said first and second server, and

(ii) wherein restarting the migration comprises restarting the migration for the subresource (Claim 12 is rejected based on the same reason as of claim 1. Blumenau's

paragraph 50 further discloses the state information #301 can be easily configured to include state information for any data granularity (volume, data blocks, groups of data blocks, a track or any portion of data..)) .

As in claim14, Blumenau discloses a process for moving resources across a storage system having a plurality of storage servers (Fig 4: #401A, #401B servers) with a set of resources partitioned thereon (Fig 4: set of data in volumes), comprising the steps of monitoring a load on a server and communicating with other load monitor processes for generating a measure of loading on respective ones of the plurality of servers;

Blumenau further discloses transferring, as a function of the measured loads, a resource from one of said plurality of servers to another of said plurality of servers in response to said measure of loading (Blumenau in another embodiment, paragraph 64 teaches a load balance data transferring, as a function of the measured requests to servers, data from a storage #402A is migrated to another storage system); and

Blumenau further disclose a write-detect process which:
detects when a resource write request applies to a resource that is in the process of being moved from a first server to a second server, and which in response to such resource write request writes copies of the resource to both of said first and second server (Blumenau's paragraph 39, detecting the write requests to be applied to an area being migrated, in response to such write requests, write to both source and target volumes to insure consistency between the source and target volumes, see Blumenau's paragraph 40) and

in response to a write failure on the second server, restarts the migration process for the resource to ensure that the write request is propagated to the second server (Blumenau's paragraphs 39-40 discloses writing to both source and target volumes to ensure the write requests are received by both source and target volume. Blumenau's paragraphs 42 in an embodiment further discloses in response to a write failure, for example at the target, the write is not completed, the migration process is restarted "the DBMS will reissue the request").

Claim 15 is rejected based on the same reasons as of claim 2.

Claim 16 is rejected based on the same reasons as of claim 4.

Claim 17 is rejected based on the same reasons as of claim 6.

Claim 18 is rejected based on the same reasons as of claim 7.

Claim 19 is rejected based on the same reasons as of claim 8.

Claim 20 is rejected based on the same reasons as of claim 10.

Claim 21 is rejected based on the same reasons as of claim 9.

Claim 23 is rejected based on the same reason as of claim 14. Blumenau's paragraph 50 further disclose the state information #301 can be easily configured to include state information for any data granularity (volume, data blocks, groups of data blocks, a track or any portion of data..).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Blumenau et al (US 2004/0080558) as applied to claim 1 and in view of Appellant's admitted prior art (APA).

As in claim 5, Blumenau does not expressly disclose the storage system is a Storage Area Network. However, APA's page 3 discloses storage devices are further configured as Storage Network Area. It would have been obvious to one of ordinary skill in the art at the time of invention to include the storage devices in SAN configuration as suggested by APA in Blumenau's system thereby further provide users of several networks can easily share data stored in a large high speed network storage system (APA's page 3).

**(10) Response to Argument**

A) Regarding Appellant's arguments at pages 4-9 for the rejections of claims 1-4, 6-10, 12, 14-21 and 23 under 35 U.S.C 103(a), the arguments are not persuasive.

A1) Appellant argues,

" .. Blumenau discloses a write error recovery process, and to that extent, is similar to Appellants' claimed invention. Blumenau specifically compares source and target data with state information to determine which data is still "good" and which data is "bad" (see paragraph [0048], lines 2-5 and paragraph [0049], lines 2-7). For example, the state information may be a count which indicates the number of data base operations performed on a particular storage location (see paragraph [0051]). Blumenau's recovery process then specifically copies the good data from the storage location where the write completed successfully to the other location, based on the state information. See paragraph [0048], lines 5-7 and [85], lines 9-12. Alternatively, Blumenau's recovery process

can invalidate data stored at both locations. See paragraph [0048], lines 20-23 and paragraph [85], lines 9-11. The Examiner points to Blumenau at paragraphs [0039 through 0040] as supposedly teaching the features of almost all of Appellants' invention. The Examiner furthermore believes that Blumenau's paragraph [0042] discloses that when the write is not completed, "a migration process is restarted", pointing to Blumenau's specific statement that the "DBMS will reissue the request". However, the mere suggestion that a Data Base Management System (DBMS) reissue a write request for a particular piece of data is not the same thing as restarting a resource migration process. Appellants' claimed resource migration is the process of moving a portion of a partitioned resource (e.g., a large chunk of data) to a different location. (Appeal brief's page 7);

In response, the first point of argument, “the mere suggestion that a Data Base Management System (DBMS) reissue a write request for a particular piece of data is not the same thing as restarting a resource migration process. Appellants' claimed resource migration is the process of moving a portion of a partitioned resource (e.g., a large chunk of data) to a different location” is not persuasive and Examiner disagrees.

It's noted that the claim merely claims "resource”. And the size of the resource is not being described and/or claimed. Thus, the resource can reasonable be interpreted as a unit of data of any size. In fact, the specification’s page 2 discloses a similar broad interpretation of “unit”, it states “..note that, in this disclosure, the term "resource" is to be understood to encompass, although not be limited to the files, data blocks or pages,

applications, or other services ..". In addition, the claim's migration process can be interpreted simply as a process to move unit of data. Nothing in the claim that further characterizes the resource and further characterizes the process to move the resource such that the resource must be " a partitioned resource (i.e **a large chunk of data**).." as argued. Therefore, for example during a migration process, such that data unit size is contained in a migration/transfer unit, of course the migration process is restarted to transfer the same data unit again. In fact, Blumenau teaches that migration can be one or more I/O operations. In case of the migration with one i/o operation, of course the whole migration process, i.e the pending I/O operation must be retry when the system crash (par. 41, "handle a crash that occurs while performing a migration and while **one or more I/O write operations** are pending").

A2) Appellant further argues,

" .. In other words, Blumenau teaches only that high level application can reissue a write request.. Appellant on the other hand, "restart a migration process: that is responsible "for transferring a resource" from one server to another in response to said method of loading (i.e at a different level which would be invisible to an application level DBMS)." (Appeal Brief's pages 7-8).

In response, first, nothing in the claim and/or specification that discloses migration process is at different level which would be invisible to application level. Second, the claim does not claim "restart a migration .. in responsible to the method of loading". Instead the claim states "in response to a write failure on the second server, restart the migration process for the resource to ensure that the write request is

propagated to the second server" . The claim only requires response to a write failure, nothing else is said/claimed about in response to the method of loading. Nothing else is said/claimed about transparently/invisible of the application level. Thus the argument is not persuasive because Appellant's arguments that support these assertions are not commensurate in scope with the language of the claim.

A3) Appellant further argues,

"…With respect to other aspects of the Examiner's argument, we note that Blumenau also does not actually disclose that the server processes communicate with each others to generate a measure of loading on the respective servers as claimed. The Examiner points to Blumenau's state table 105 as providing this information. However, that table stores state information concerning backup, copy, and recovery. It does not include, suggest or teach maintaining a data indicative of load across a plurality of servers or doing anything in response to the same, never mind restarting a migration process, as claimed" (appeal brief's pages 5-6)"

In response, Blumenau teaches state table, the state table mainly uses to determine the state of transferring data/requests in the system, whether one or more portions of data are successfully transferring to the destination, such that the copying/migrating operation can be recovered. Thus state table is state information of requests being pending for processes in data storage system, see par. 31, "..the data storage process for which state information is stored may be, for example, a backup, copy, recovery, migration **or any other type of processing involving storage**.". This

pending of i/o requests in each table indicates the workload of i/o requests of each server / processor among group of severs / processors. Using this state information, the system can readily determine requests pending in servers / storage systems and thus can rebalancing requests/loads in servers / storage systems by migrating data from one server /storage system to another server / another storage system to improve the overall system's performance, see par. 64, "..A data migration from one location to another may be performed for any number of reasons. For example, there may be a desire to migrate data from storage system 402A to another storage system because of **performance reasons (e.g., storage system 402A is processor bound or approaching its performance limit**), or for storage capacity reasons ..".

A4) Appellant further argues,

" Blumenau teaches away as he requires keeping state information.

Appellants also note that Blumenau requires that write state consistency information be maintained. **Indeed, Blumenau specifically states his is a technique for recovering the state of write process without having to reperform operations that were completed successfully before the interruption (see the Abstract and paragraph [0029]). In contrast to this, Appellants' invention does not maintain state information, and specifically requires restarting the migration** process. Blumenau uses a state information table 105 that stores the state of pending I/O operations. As explained in paragraph [0034], the state information table 105 provides an indication of the status of input/output (I/O) operations performed on one or more storage

locations of storage system 102. Blumenau then goes on to explain that when a write is performed on one or more portions of data 203 on volume 201, an indicator is updated in the state change information table (Blumenau, paragraph [0034]). This information is a bit that indicates that a change has been made to the data stored in a corresponding storage location. In other words, Blumenau only teaches one to store state information to enable picking up exactly from where the error occurred. It thus teaches away from restarting, from the beginning, a write recovery process. (appeal's brief pages 8-9).

In response, Blumenau's teaching of a state table which include the capability of keep track portions of data being transferred whether they are completed successful or not. The portion of data transfer can be any size. For example an i/o operation can be contains in a transferring unit for a small size data transferring that only requires a single data transferring. If this data transferring unit can not successfully migrated, of course, the whole data transferring unit is restart for migration again, see discussion in item A1 above. Therefore Blumenau's teaching of state table is in no way teaching away from the claim's restart migration process.

A5) Appellant further argues,

*"Claim 6 should be allowed.* There are additional reasons why at least Claim 6 should be allowed. The Examiner is of the opinion that the prior art further discloses that a load monitor process determines when a server is servicing a disproportionate share of client requests in a server group. The Examiner refers to Blumenau's paragraph [0064] for supposedly teaching this feature. There is a

mention in that paragraph of monitoring when the storage system becomes "processor bound", "approaching its performance limit", or its "storage capacity". But these do not amount to a teaching, suggestion or even any inference that there is any determination of which share of client requests are being handled by a specific server, as claimed." (appeal brief's page 9).

In response, Examiner disagrees. Blumennau's paragraph 64 discloses an embodiment with logic that determines when a processor approaches its performance limit then moving data to another processor, so that data can be requested and be serviced from the another processor subsequently and relieving the processor from approaching its performance limit. Of course, the another processor must not approaching its performance limit otherwise it would be meaningless for the purpose of migration data to the another processor. Therefore Appellant's argument is not persuasive.

A6) Appellant argues,

"*Claim 8 should be allowed.* Blumenau admittedly does disclose a state information table that is used to track the state of a storage element in a logical volume. For example, in paragraph [0051 ] is explained that state information 301 may include a count 302 which indicates a number of data operations performed on a corresponding storage element of volume 303. It is also stated in paragraph [0054] that state information may include other information used for recovery, such as to track information as needed for disk mirror processes. However, there is no mention, suggestion, or teaching in Blumenau that this state table is used to

perform any routing function among equivalent servers, or maintain data that would permit request routing based on the same. Appellants' Claim 8, on the other hand, is directed to a routing table for tracking which resources are maintained on which servers in the system. Since Blumenau does not even disclose a plurality of storage servers that share a set of resources partitioned thereon, there is no need for him to either maintain such a routing table or determine how to route client requests among servers. The Examiner also argues that paragraph [0064] in Blumenau teaches that a load monitor process monitors one or more of network traffic load, I/O request load or storage traffic pattern type. But the Examiner is merely repeating Appellants' claim language. None of these functions are actually stated in Blumenau, which merely determines when a storage system "becomes processor bound", "approaches a performance limit", or is "reaching storage capacity limits". These do not amount to teaching the more specifically claimed aspects monitoring of traffic load, I/O request load, or storage traffic pattern type (appeal brief's pages 9-10).

In response, Blumenau teaches a storage system includes groups of servers sharing serving clients' data, wherein data is moving migrating among servers, therefore routing information, i.e. claim's routing table is required. Blumenau's par. 64 further discloses when a server / processor approaches a performance limit, data should be offloading to another server / processor , so that data can be requested and be serviced from the another processor subsequently and relieving the processor from approaching its performance limit. Of course, the another processor must not

approaching its performance limit otherwise it would be meaningless for the purpose of migration data to the another processor. Blumenau further teaches each server / processor has a table tracking i/o being services, whether they are completed or still being processed, see par. 34. This table clearly indicates the workload (i.e i/o requests etc..) of a processor in relative with workload in another processor, and thus it directly provides information to determine which another processor should be used for data migrating or routing data from a processor approaching performance limit to another processor not approaching performance limit.

A7) With regard to argument of claim 14 at page 10 of the Appeal Brief, Appellant relies on similar arguments for claim 1. Accordingly, Examiner maintain the rejecting of these claims and there dependent claims under the same reasoning presented above

A8) With regard to argument of claims 17 and 19 at page 10. Appellant relies on similar arguments as present above for claims 6 and 8. Accordingly, Examiner maintains the rejecting of these claims under the same reasoning presented above.

B) With regard to argument at page 11 for the rejection of claim 5 under 35 USC 103(a), the argument is not persuasive.

Appellant argues,

"claim 5 depends from claim 1 and adds a requirement mat me storage system is a Storage Area Network. There is no suggestion in the Blumenau or the Admitted Prior Art that a Storage Area Network can have a resource migration process that is restarted, from the beginning, upon detection of a migration write failure ".

In response, Blumenau clearly teaches the claim's restart for resource migration process for data among servers in a network environment, see discussion in items A0-A8 above. Blumenau clearly teaches the migration process only require two essential elements: chunk of data and servers in the network as recited in the claims. Of course, these two essential elements are required in any type of networks including SAN, which is further taught by Admitted prior art. Therefore, Appellant's argument is not persuasive.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/ Duc T Doan/

Examiner, Art Unit 2185

Conferees:

/Kevin L Ellis/
Supervisory Patent Examiner, Art Unit 2117

/Sanjiv Shah/
Supervisory Patent Examiner, Art Unit 2185